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Part VI

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Flood Damage Prevention: Level of Protection for Urban Areas; Policies and Procedures

DEPARTMENT OF DEFENSE

Corps of Engineers, Department of the Army

33 CFR Part 396

[ER 1105-2-XXX]

Flood Damage Prevention: Level of Protection for Urban Areas; Proposed Policies and Procedures

AGENCY: Corps of Engineers, DOD.

ACTION: Proposed rule.

SUMMARY: This regulation provides guidance on the selection of the level of protection for flood damage prevention projects in urban areas, particularly high levees, high floodwalls, and rapid flow channels. Extensive damage and loss of life could occur in urban areas if high levees or high floodwalls were overtopped or overbank flooding occurred from high depth and rapid flow channels. The Standard Project Flood is the goal for minimum level of protection where the damages from floods exceeding the level of protection could be considered a catastrophe.

DATES: Comments must be received by June 30, 1980.

ADDRESS: Comments to: Department of the Army, Office of the Chief of Engineers, ATTN: (DAEN-CWP-A), WASH, DC 20314.

FOR FURTHER INFORMATION CONTACT: Barry Kennedy, Planning Division, Office of the Chief of Engineers (DAEN-CWP-A), WASH, DC 20314. (202-272-0141).

SUPPLEMENTARY INFORMATION: The 100-year flood is not established as a criterion for flood damage prevention except in floodplain management considerations. Flood damage prevention projects should be designed for maximum effectiveness, safety, and with consideration of catastrophic flood events. Some situations, such as a short warning, very high velocities, or great depths of inundation, constitute a special class with high potential for a catastrophe and require special care. Accordingly, the Department of the Army proposes to add a new Part 396 to read as set forth below.

Dated: April 15, 1980.

Forrest T. Gay III,

Colonel, Corps of Engineers, Executive Director, Engineer Staff.

It is proposed to add a new 32 CFR Part 396 to read as follows:

PART 396—FLOOD PREVENTION: LEVEL OF PROTECTION FOR URBAN AREAS

Sec.

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Authority: U.S. Water Resources Council, Floodplain Management Guidelines (43 FR 6030), 10 February 1978.

§ 396.1 Purpose.

This regulation provides guidance on the selection of the level of protection to be afforded by Corps of Engineers flood damage prevention projects in urban areas particularly, high levees, high floodwalls and rapid flow channels. It also clarifies the use of freeboard as it relates to level of protection.

§ 396.2 Applicability.

This regulation is applicable to all OCE elements and all field operating activities having Civil Works responsibilities.

§ 396.3 References.

(a) U.S. Water Resources Council, Floodplain Management Guidelines (43 FR 6030), 10 February 1978.

(b) U.S. Water Resources Council Procedures for Evaluation or National Economic Development (NED) Benefits and Costs in Water Resources Planning (Level C); Final Rule (18 CFR Part 713), 14 December 1979.

(c) ER 1105-2-10
(d) ER 1105-2-200
(e) ER 1105-2-250
(f) ER 1105-2-250
(g) ER 1165-2-26
(h) ER 1110-2-1411
(i) ER 1110-2-1601

§ 396.4 Definitions.

For the purposes of this regulation, the following definitions are established:

(a) "Catastrophe" is an event causing sudden and widespread misfortune, destruction or irreplaceable loss; a catastrophe may be said to occur when many human lives are endangered, human lives will likely be or have been lost, or urban property damage occurs extensive enough to cripple activities in the area.

(b) "Freeboard" is the vertical height between the design water surface (profile or flat pool) and the design grade of the flood damage prevention project. Allowances for settlement, aggradation and future increases in flood flows are not included in the freeboard height.

(c) "High levees" are levees of such a height and character that an overtopping as a result of flood waters (with or without failure) may cause depths of inundation and/or velocities that could result in a catastrophe. A similar definition holds for high floodwalls and rapid flow channels.

(d) "Level of protection" is the criterion used to express the flood damage prevention effectiveness of a project and may be based on peak discharge, stage, volume, duration, or any combination of characteristics that significantly affect project functional characteristics. Note that the terms level of protection and project design flood are not always synonymous. Major reaches of a project may have different levels of protection and level of protection may change with time. The general definition of level of protection applicable to any flood damage prevention project is the flood level at which flood damages and/or other adverse effects not eliminated by the project are considered relatively minor. More concise definitions for some specific types of projects are as follows:

(1) *Flood storage (lake).* The flood controlled by lake storage to planned discharge rates at the control (dam), or at a downstream damage location, considering local inflow, which result in relatively minor adverse effects. The flood damage prevention becomes less reliable and level of protection will decrease as the distance downstream of the control (dam) increases.

(2) *Levee and floodwall.* The flood which the levee or floodwall is designed to contain, excluding freeboard. This definition may also apply to paved channels (with a clearly defined top of bank) that carry rapid flow (EM 1110-2-1601, para. 8d). The project design flood and level of protection are the same for levees and floodwalls, exluding residual interior flooding.

(e) "Probable Maximum Flood (PMF)" is the largest flood that might be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

(f) "Risk" is the probability that one or more flood events will exceed a given magnitude within a specified period of years.

(g) "Standard Project Flood (SPF)" is a hypothetical flood that might be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably charcteristic of

the geographical region involved, excluding extraordinarily rare combinations. This definition is taken from EM 1110–2–1411, which provides specific instructions for computing the standard project flood.

(h) "Urban areas" are concentrations of habitation and supporting activities and may be parts of cities, towns, or other incorporated or unincorporated political subdivisions of States that occupy an essentially continuous area of developed land, containing such structures as residences, public and commercial buildings, and industrial sites.

§ 396.5 Perspective on the Standard Project Flood (SPF) as an appropriate level of protection.

The SPF is not the maximum flood that can occur. The probable maximum flood is commonly on the order of twice the SPF. While the SPF is not determined on the basis of frequency studies, comparisons show the SPFs commonly have exceedence intervals from a few hundred to a few thousand years. If a SPF corresponds to an 0.25 percent chance flood, for instance, there is about a 22 percent risk that it will be exceeded one or more times in a project life of 100 years. This would imply a substantial risk of exceeding such a flood level even though design for SPF may have the appearance of providing a high level of protection.

§ 396.6 Policy of level of protection.

(a) Where the damages from floods exceeding the level of protection would be considered a catastrophe, the SPF is the goal for minimum level of protection that district engineers should recommend for urban areas. This policy is particularly applicable to flood damage prevention projects involving high levees, high floodwalls, and rapid flow channels.

(b) In areas not covered by the policy given in § 396.6(a), i.e., there is no indication that floods, up to an SPF, exceeding the level of protection would cause a catastrophe, district engineers may recommend what they determine to be an appropriate degree of protection on the basis of the planning process, as discussed in § 396.7. District engineers shall assure their reports fully document and support their recommendations.

(c) Flooding resulting from interior runoff and seepage—"interior flooding"—must always be evaluated to assess the actual level of protection provided by plans involving levees and floodwalls. Any difference between the level of protection provided by the levee and floodwall structures and the interior flood control system must be explained in the report, accounted for in the project economics and made clear to the public.

§ 396.7 Selection of level of protection.

The planning process is described in Part 290 of this chapter, including the formulation and evaluation of alternative measures. In the case of flood damage prevention, the Corps must consider various practicable structural and non-structural measures to achieve the desired level of protection. The one percent chance (100-year) flood is not established as a criteria for flood damage prevention except in floodplain management considerations. Flood damage prevention projects should be designed for maximum effectivenes, safety and with consideration of catastrophic flood events. Other regulations fully describe the types of measures which may be considered. The following procedure should be followed and documented in the feasibility report and in an Advanced Engineering and Design (AE&D) reformulation planning report regardless of the type of flood damage prevention measure:

(a) Formulate plan for the standard project flood.

(b) Formulate other plans for higher (floods up to PMF may be considered) or lower degrees of protection based on the planning objectives established for the study, including such elements as possible loss of life, flood impacts, desires of local interests, environmental and social considerations, and other factors such as design considerations.

(c) Based on level of protection and economic benefits developed in § 396.7 (a) and (b), formulate a plan that provides the greatest level of protection consistent with maximizing net benefits. However, maximization of net benefits will not serve by itself as the decision criteria.

(d) Evaluate the plans formulated in § 396.7 (a), (b), and (c), following the provisions of Part 295 of this chapter and the WRC Manual of Procedures. The estimates of remaining damages must include both average annual damages and the remaining damages from a single occurrence of the standard project flood. The remaining average annual (nonpreventable) damages should include those for all floods greater than the level of protection provided. In addition to damages, assessment of residuals should consider all intangibles, including the physical impacts of flooding. Consider the reliability of the data, the chance and risk of exceeding various floods, and the consequences of exceeding various floods, including the potential for a catastrophe. Some situations, such as a short warning time, very high velocities, or great depths of inundation, constitute a special class with high potential for a catastrophe and require special care. The evaluation data and process should be documented in the report.

(e) Select an appropriate level of protection based on the evaluation in § 396.7(b) and the policy of § 396.6. Plan selection considerations should include local conditions, an analysis of available alternatives and the residual flood conditions, resulting from the alternatives.

(1) The recommended degree of protection and local cooperation requirements must be consistent with the requirements of Executive Order 11988, as implemented by § 396.3 (a) and (g). The provisions of ER 1165–2–26 should be incorporated into the multiobjective planning process of preauthorization studies and in the AE&D planning and design studies.

(2) In urban areas if the district engineer recommends less than SPF protection but greater protection than the one percent chance flood, the report must present at least one alternative with SPF protection and the district engineer's rationale for providing less than SPF protection.

(3) In urban areas, if the district engineer recommends protection less than the one percent flood, the report must present at least one alternative (detailed plan) with protection against the one percent chance flood, in addition to the presentation of at lease one alternative with SPF protection and the district engineer's rationale for selection such level of protection.

(4) In urban areas, if the district engineer recommends SPF protection because of the safety aspects, the report should contain the data on population, structures, flood depths and velocities, possible damages, etc., that led to that decision.

§ 396.8 Coordination.

When levels of protection lower than the SPF are being considered for plans involving levees and/or floodwalls in urban areas, division engineers should coordinate with OCE in reviewing the adequacy of proposed flood damage prevention plans. In urban areas, if the district engineer is considering a channel improvement project, which satisfies the requirements of §§ 396.6(b) and 396.7 but which provides protection substantially less than one percent, he should coordinate with the division engineer in determining the adequacy of the level of protection for the location and situation. Coordination should be part of the normal Intensive

Management Program (see ER 1105–2–10).

§ 396.9 Claims of protection provided within freeboard.

Statements or implications that a flood damage prevention project, because of freeboard, will protect against any flood larger than the design flood shall not be included in feasibility, post-authorization planning, or other related reports or otherwise communicated to the public. The potential for flood-fight enhancement of the level of protection may be set forth in the report.

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